GE Nuclear Energy

General Electric Company
175 Curtner Avenue, San Jose, CA 95125

March 16, 1993

Docket No. STN 52-001

Chet Poslusny, Senior Project Manager
Standardization Project Directorate
Associate Directorate for Advanced Reactors
and License Renewal
Office of the Nuclear Reactor Regulation

Subject: **Submittal Supporting Accelerated ABWR Review Schedule - Open Item 14.1.3.8-1**

Dear Chet:

Enclosed are the proposed changes to SSAR Sections 1.8, 3.8 and 3.9 which adress Open Item 14.1.3.8-1 pertaining to welding. These changes were reviewed with D. Terao during the ITAAC review meeting in San Jose, CA from January 11, 1993 through January 20, 1993.

Please provide a copy of this transmittal to Dave Terao.

Sincerely,

Jack Fox

Jack Fox
Advanced Reactor Programs

cc: Norman Fletcher (DOE)
Roy Louison (GE)

JF93-58

TABLE 1.8-21 (Continued)

INDUSTRIAL CODES AND STANDARDS
APPLICABLE TO ABWR

Code or Standard Number	Year	Title
SSPC		
PA-1	1972	Shop, Field and Maintenance Painting
PA-2	1973	Measurements of Paint Film Thickness with Magnetic Gages
SP-1	1982	Solvent Cleaning
SP-5	1985	White Metal Blast Cleaning
SP-6	1986	commercial Blast Cleaning
SP-10	1985	Near-White Blast Cleaning
OTHERS		
TEMA C	1978	Standards of Tubular Exchanger Manufactures Association
UL-44	1983	Rubber-Insulated Wires and Cables
--	--	Crane Manufactures Association of America, Specification No. 70
--	--	Aluminum Construction Manual by Aluminum Association
NCIG-01	Rev.2	Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants

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3.8.1.6.5 Quality Control

Quality control procedures are established in the Construction Specification and implemented during construction and inspection. The Construction Specification covers the fabrication, furnishing, and installation of each structural item and specifies the inspection and documentation requirements to ensure that the requirements of the ASME Code, Section III, Division 2, and the applicable Regulatory Guides are met.

3.8.1.6.6 Welding Methods and Acceptance Criteria for Containment Vessel Liner and Appurtances

Welding methods and acceptance criteria for the containment vessel liner and appurtance are the same as those for the steel components of the concrete containment vessel (i.e., personnel air locks, equipment hatches, penetrations, and drywell head) given in Subsection 3.8.2.7.1.

3.8.1.7 Testing and Inservice Inspection Requirements

3.8.1.7.1 Structural Integrity Pressure Test

A structural integrity test of the containment structure will be performed by the COL applicant in accordance with Article CC-6000 of the ASME Code, Section III, Division 2 and Regulatory Guide 1.136, after completion of the containment construction. The test is conducted at 115% of the design pressure condition of 45 psig in both the drywell and suppression chamber, simultaneously. A pressure test for the design differential pressure condition of 25 psig between the drywell and the suppression chamber is also performed where the drywell pressure is greater than the suppression chamber pressure.

During these tests the suppression chamber and spent fuel pool are filled with water to the normal operational water level. Deflection and concrete crack measurements are made to determine that the actual structural response is within the limits predicted by the design analysis.

In addition to the deflection and crack measurements, the first prototype containment structure is instrumented for the measurement of strains in accordance with the provisions of Subsubarticle CC-6230 of the ASME Code, Section III, Division 2. See Subsection 3.8.6.3 for COL license information.

3.8.1.7.2 Preoperational and Inservice Integrated Leak Rate Test

Preoperational and inservice integrated leak rate testing is discussed in Subsection 6.2.1.

3.8.2 STEEL COMPONENTS OF THE REINFORCED CONCRETE CONTAINMENT

3.8.2.1 Description of the Containment

The ABWR has a reinforced concrete containment vessel (RCCV) as described in Subsection 3.8.1. This section will describe the following steel components of the concrete containment vessel:

(1) Personnel Air Locks

(2) Equipment Hatches,

(3) Penetrations

(4) Drywell Head

3.8.2.1.1. Description of Penetrations

The penetrations through the RCCV include the following.

3.8.2.1.1.1 Personnel Air Locks

Two personnel air locks with an inside diameter sufficient to provide 6 ft., 8 in., high by 3 ft., 6 in., wide minimum clearance above the floor at the door way are provided. One of these air locks provides access to the upper dry well and the other provides access to the lower drywell via the access tunnel.

Lock and swing of the doors is by manual and automatic means. The locks extend radically outward from the RCCV into the reactor building and are supported by the RCCV only. The minimum clear horizontal distance not impaired by the door swing is 6 ft.

Each personnel air lock has two pressure-seated doors interlocked to prevent simultaneous

opening of both doors and to ensure that one door is completely closed before the opposite door can be opened. The design is such that the interlocking is not defeated by postulated malfunctions of the electrical system. Signals and controls that indicate the operational status of the doors are provided. Provision is

(7) bar and machine steel (A576, carbon content not less than 0.3%); and

(8) clad (SA-240 type 304L).

The structural steel materials located beyond the containment vessel boundaries are as follows:

(1) carbon steel (A36 or SA-36) and

(2) stainless steel extruded shapes (SA-479).

The materials meet requirements as specified in Subarticle NE-2000 of ASME Code Section III. The lowest service metal temperature is 30°F.

3.8.2.7 Testing and Inservice Inspection Requirements

Leakage of the containment vessel, including the steel components is described in Subsection 3.8.1.7.

3.8.2.7.1 Welding Methods and Acceptance Criteria

Welding activities shall be performed in accordance with requirements of Section III of the ASME Code. The required nondestructive examination and acceptance criteria are provided in Table 3.8-8.

3.8.2.7.2 Shop Testing Requirements

The shop tests of the personnel air locks include operational testing and an overpressure test. After completion of the personnel air locks tests (including all latching mechanisms and interlocks) each lock is given an operational test consisting of repeated operating of each door and mechanism to determine whether all parts are operating smoothly without binding or other defects. All defects encountered are corrected and retested. The process of testing, correcting defects, and retesting are continued until no defects are detectable.

High strength structural steel plates	ASTM A572 or A441
Bolts, studs, and nuts (dia. $\geq$ 3/4 ")	ASTM A325 or A490
Bolts, studs, and nuts (dia. $\leq$ 3/4 ")	ASTM A307

3.8.3.6.5 Other Internal Structures

The materials conform to all applicable requirements of ANSI/AISC N690 and comply with the following:

Item	Specification
Miscellaneous platforms	Same as Section 3.8.3.6.4
Lower drywell equipment tunnel	ASTM A516 Grade 70 SA-240 Type 304 L
Lower drywell personnel tunnel	ASTM A516 Grade 70 SA-240 Type 304 L
Reactor shield wall stabilizer	
--tube sections	ASTM A501
--plates	ASTM A36
Lower drywell floor fill material	A material other than limestone concrete

3.8.3.7 Testing and Inservice Inspection Requirements

A formal program of testing and inservice inspection is not planned for the internal structures except the diaphragm floor, reactor pedestal, and lower drywell access tunnels. The other internal structures are not directly related to the functioning of the containment system; therefore, no testing or inspection is performed.

Testing and inservice inspection of the diaphragm floor, reactor pedestal and lower drywell access tunnels are discussed in Subsection 3.8.1.7.

3.8.3.8 Welding Methods and Acceptance Criteria for Structural and Building Steel

Welding activities shall be accomplished in accordance with written procedures and shall meet the requirements of the American Institute of Steel Construction (AISC) Manual of Steel Construction. The visual acceptance criteria shall be as defined in American Welding Society (AWS) Structural Welding Code D1.1 and Nuclear Construction Issue Group (NCIG) Standard, *Visual Weld Acceptance Criteria for Structural Welding at Nuclear Plants,* NCIG-01.

3.8.4 OTHER SEISMIC CATEGORY I STRUCTURES

Other Seismic Category I structures which constitute the ABWR Standard Plant are the reactor building, control building and radwaste building substructure. Figure 1.2-1 shows the spatial relationship of these buildings. The only other structure in close proximity to these structures is the turbine building. They are structurally separated from the other ABWR Standard Plant buildings.

The Seismic Category I structure within the ABWR Standard Plant, other than the containment structures, that contains high-energy pipes is the reactor building. The steam tunnel walls protect the reactor building from potential impact by rupture of the high-energy pipes. This building is designed to accommodate the guard pipe support forces.

The reactor building, steam tunnel, residual heat removal (RHR) system, reactor water cleanup (RWCU) system, and reactor core isolation cooling (RCIC) system rooms are designed to handle the consequences of high energy pipe breaks. The RHR, RCIC, and RWCU rooms are designed for differential compartment pressures, with the associated temperature rise and jet force. Steam generated in the RHR compartment from the postulated pipe break exits to the steam tunnel through blowout panels. The steam tunnel is vented to the turbine building through the seismic interface restraint structure (SIRS). The steam tunnel, which contains several pipelines (e.g., main steam, feedwater, RHR), is also designed for a compartment differential pressure with the associated temperature changes and jet force.

Seismic Category I masonry walls are not used in the design. The ABWR Standard Plant does not contain seismic Category I pipelines buried in soil.

3.8.4.1 Description of the Structures

3.8.4.1.1 Reactor Building Structure

The reactor building (RB) is constructed of reinforced concrete with a steel frame roof. The RB has four stories above the ground level and three stories below. Its shape is a rectangle of 59 meters in the E-W direction, 56 meters in the N-S direction, and a height of about 57.9 meters from the top of the basemat.

3.8.4.2.3 Radwaste Building Substructure

The radwaste building substructure shall be designed using the same codes and standards as the reactor building. Refer to Subsection 3.8.4.2.1 for a complete list.

In addition, the non-Seismic Category I reinforced concrete portion of the superstructure is designed according to the seismic provisions of Section 2314 of the uniform building code.

3.8.4.2.4 Seismic Category I Cable Tray and Conduit Supports

(1) All codes, standards, and specifications applicable to the building structures shall also apply to cable tray and conduit supports.

(2) AISI SG-673, Specification for the Design of Cold-formed Steel Structural Members.

(3) NEMA, Fittings and Supports for Conduit and Cable Assemblies.

3.8.4.2.5 Welding and Weld Acceptance Criteria

3.8.4.2.5.1 Welding of Electrical Cable Tray and Conduit Supports

Welding activities shall be accomplished in accordance with the AWS Structural Welding Code, D1.1. The weld visual acceptance criteria shall be as defined in AWS Structural Welding Code D1.1 and NCIG-01.

3.8.4.5.2 Welding of Heating Ventilation and Air Conditioning Supports

Welding activities shall be accomplished in accordance with the AWS Structural Welding Code, D1.1. The weld visual acceptance criteria shall be as defined in AWS Structural Welding Code D1.1 and NCIG-01.

3.8.4.5.3 Welding of Refuel Cavity and Spent Fuel Pool Liners

Welding activities shall be accomplished in accordance with the AWS Structural Welding Code, D1.1. The welded seams of the liner plates shall be spot radiographed where accessible, liquid penetrant and vacuum box examined after fabrication to ensure that the liner does not leak. The acceptance criteria for these examinations shall meet the acceptance criteria stated in subsection NE-5200 of Section III of the ASME Code.

3.8.4.3 Loads and Load Combinations

3.8.4.3.1 Reactor Building

The temperature and pressure loads caused by a LOCA do not occur on the reactor building. The reactor building ventilation system is designed to keep the building within operating design conditions.

3.8.4.3.1.1 Loads and Notations

Loads and notations are as follows:

D = dead load of structure plus any other permanent load

L = conventional floor or roof live loads, movable equipment loads, and other variable loads such as construction loads. The following live loads are used:

Concrete floors and slabs (including roofs) - 200 psf. Stairs, stair platforms, grating floors, and platforms - 100 psf. Concrete roofs, live or snow load (not concurrent) - 50 psf. Construction live load on floor framing in addition to dead weight of floor - 50 psf*.

R_o = pipe reactions during normal operating or shutdown conditions based on the most critical transient or steady-state condition.

R_a = pipe reactions under thermal conditions generated by the postulated break and including R_o

Y_r = equivalent static load on a structure generated by the

reaction on the broken high-energy pipe during the postulated break and including a calculated dynamic factor to account fro the dynamic nature of the load.

Y_j = jet impingement equivalent static load on a structure generated by the postulated break and including a calculated dynamic factor to account for the dynamic nature of the load.

Y_m = missile impact equivalent static load on a structure generated by or during the postulated break, like pipe whipping, and including a calculated dynamic factor to account for the dynamic nature of the load.

W = wind force (Subsection 3.3.1)

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* *If the actual construction live load is greater than this value a design check of the structures will be made.*

Table 3.8-8

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR CONTAINMENT VESSEL (1)(2)(3)

Component	Weld Type	NDE Requirements
Containment	Category A, butt welds (Long'l)	RT
Containment	Category B, butt welds (Circ.)	RT
Containment	Category C, butt welds	RT
Containment	Category C, nonbutt welds	UT or MT or PT
Containment	Category D, butt welds	RT
Containment	Category D, nonbutt welds	UT or MT or PT
Containment	Structural attachment welds a) Butt welds b) Nonbutt welds	 RT UT or MT or PT
Special Welds	Weld metal cladding	PT

NOTES:

(1) The required confirmation that facility welding activities are in compliance with the requirements will include the following third-party verifications:

(a) Facility welding specifications and procedures meet the applicable ASME Code requirements;

(b) Facility welding activities are performed in accordance with the applicable ASME Code requirements;

(c) Welding activities related records are prepared, evaluated and maintained in accordance with the ASME Code requirements;

(d) Welding processes used to weld dissimilar base metal and welding filler metal combinations are compatible for the intended applications;

(e) The facility has established procedures for qualifications of welders and welding operators in accordance with the applicable ASME Code requirements;

(f) Approved procedures are available and used for preheating and post heating of welds, and those procedures meet the applicable requirements of the ASME Code;

(g) Completed welds are examined in accordance with the applicable examination method required by the ASME Code.

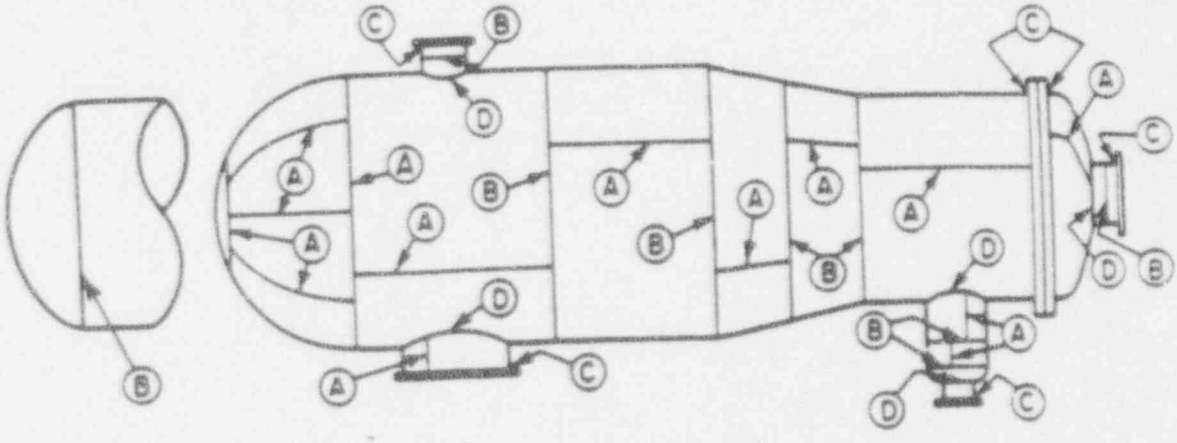
Table 3.8-8
WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR CONTAINMENT VESSEL (1)(2)(3) (Continued)

(2) Radiographic film will be reviewed and accepted by the licensee's nondestructive examination (NDE), Level III examiner prior to final acceptance.

(3) The NDE requirements for containment vessels will be as stated in subarticle NE-5300 of Section III of the ASME Code.

LEGEND:

RT - Radiographic Examination
MT - Magnetic Particle Examination
PT - Liquid Penetrant Examination
LEGEND (Continued):



Categories A, B, C, and D Welded Joint Typical Locations

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The loading combinations and design criteria for pipe whip restraints utilized to mitigate the effects of postulated piping failures are provided in Subsection 3.6.2.3.3.

In the case of the RIP motor casing failure event, there are specific restraints applied to mitigate the effects of the failure. The mitigation arrangement consists of lugs on the RPV bottom head to which are attached two long rods for each RIP. The lower end of each rod engages two lugs on the RIP motor/cover. The use of inelastic analysis methods is limited to the middle slender body of the rod itself. The attachment lugs, bolts and clevises are shown to be adequate by elastic analysis. The selection of stainless steel for the rod is based on its high ductility assumed for energy absorption during inelastic deformation.

The mitigation for the CRD housing attachment weld failure is by somewhat different means than are those of the RIP in that the components with regular functions also function to mitigate the weld failure effect. The components are specifically:

(1) Core support plate

(2) Control rod guide tube

(3) Control rod drive housing

(4) Control rod drive outer tube

(5) Bayonet fingers

Only the cylindrical bodies of the control rod guide tube, control rod drive housing and control rod drive outer tube are analyzed for energy absorption by inelastic deformation.

Inelastic analysis for there latter two events together with the criteria used for evaluation are consistent with the procedures described in Subsection 3.6.2.3.3 for the different components of a pipe whip restraint. Figure 3.9-6 shows the stress-strain curve used for the blowout restraints.

3.9.1.6 Welding Methods and Acceptance Criteria for ASME Code Welding and Welding of Non-ASME Pressure Retaining Piping

3.9.1.6.1 ASME Code Welding

Welding activities for pressure boundary and core support structure shall be performed in accordance with the requirements of Section III or Section VIII as applicable, of the ASME Code. The required nondestructive examination and acceptance criteria are stated in Table 3.9-10. Component supports shall be fabricated and examined in accordance with the requirements of Subsection NF of Section III of the ASME Code and NCIG-01.

3.9.1.6.2 Welding of Non-ASME Pressure Retaining Piping

Welding activities involving non-ASME pressure retaining piping shall be accomplished in accoradnce with written procedures and shall meet the requirements of the ANSI B31.1 Code. The weld acceptance criteria shall be as defined for the applicable nondestructive examination method described in ANSI B31.1 Code.

3.9.2 Dynamic Testing and Analysis

3.9.2.1 Piping Vibration, Thermal Expansion, and Dynamic Effects

The overall test program is divided into two phases; the preoperational test phase and the initial startup test phase. Piping vibration, thermal expansion and dynamic effects testing will be performed during both of these phases as described in Chapter 14. Subsections 14.2.12.1.51, 14.2.12.2.10 and 14.2.12.2.11 relate the specific role of this testing to the overall test program. Discussed below are the general requirements for this testing. It

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS

CLASS 1 COMPONENTS (1) (2) (3)

Component	Weld Type	NDE Requirements
Vessel	Category A (Longitudinal)	RT plus MT or PT
Vessel, Pipe, Pump, Valve	Category B (Circumferential)	RT plus MT or PT
Pipe, Pump, Valve	Butt weld	RT plus MT or PT
	Fillet and socket welds	MT or PT
Vessels (6)	Category C and similar welds	RT plus MT or PT. RT must be multiple exposure
	Partial penetration and fillet welds	MT or PT on all accessible surfaces
Vessels (6) & Branched Connections	Category D	
	a) Butt welds, all	RT plus MT or PT
	b) Corner welded nozzles	RT plus MT or PT
	c) Corner welded branch and piping connection exceeding 4" nominal diameter	RT plus MT or PT
	d) Corner welds branch and piping 4" and less	MT or PT
	e) Weld buildup deposits at openings	UT plus a, b, c above if connected to nozzle or pipe
	f) Partial penetration	MT or PT progressive and final surface
	g) Oblique full penetration branch and piping connections	RT or UT plus MT or PT. In addition, UT of weld, fusion zone, and parent metal beneath attachment surface.
General	Fillet, partial penetration, socket welds	MT or PT
General	Structural attachment welds	MT or PT
Special Welds	1) Specially designed seals	MT or PT
	2) Weld metal cladding	PT
	3) Hard surfacing	PT
	a) Valves 4" or less	None
	4) Tube-tube sheet welds	PT
	5) Brazed joints	VT

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS (CONTINUED)

CLASS 2 COMPONENTS (1) (2) (4)		
Component	**Weld Type**	**NDE Requirements**
Vessel	Category A (Longitudinal) a) Either of the members exceeds 3/16 inch b) Each member 3/16 in. or less	 RT MT, PT, or RT
Pipe, Pump, Valve	Longitudinal	RT
Vessel	Category B (Circumferential) a) Either of the members exceeds 3/16 in. b) Each member 3/16 in. or less	 RT MT, PT, or RT
Pipe, Pump and Valve	Circumferential a) Butt welds b) Fillet and partial penetration	 RT MT or PT
Vessel (6) and Similar Joints in Other Components	Category C a) Corner joints, either of the members exceeds 3/16 in. of thickness b) Each member 3/16 in. or less c) Partial penetration and fillet welds	 RT MT, PT, or RT MT or PT
Vessel (6) and Similar Welds in Other Components	Category D a) Full penetration joints when either members exceed 3/16 in. of thickness b) Full penetration corner joints when either member exceeds 3/16 in. c) Both members 3/16 in. or less d) Partial penetration and fillet weld joints	 RT MT or PT MT or PT MT or PT
Branch Con. and Nozzles in Pipe, Valve, Pump	a) Nominal size exceed 4 in. b) Nominal size 4 in. or smaller	RT MT or PT (external and accessible internal surfaces)

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS (CONTINUED)

CLASS 2 COMPONENTS (1) (2) (4) (Continued)

Component	Weld Type	NDE Requirements
Vessels Designed to NC-3200	Category A	RT
	Category B	RT
	Category C, Butt weld	RT
	Category C, Full penetration corner	UT or RT
	Category C, Partial penetration corner and fillet welds	MT or PT both sides
	Category D, Full penetration (6)	RT
	Category D, Partial penetration	MT or PT both sides
	Fillet, partial penetration, socket, and structural attachment welds	MT or PT
Special Welds	a) Specially designed seals	MT or PT
	b) Weld metal cladding	MT or PT
	c) Hard surfacing	PT
	d) Hard surfacing for valves with inlet connection 4" nominal pipe size or less	None
	e) Tube-tube sheet welds	PT
	f) Brazed joints	VT
Storage Tanks (Atmospheric)	a) Side joints	RT
	b) Roof and roof-to-sidewall	VT
	c) Bottom joints	Vacuum box testing of at least 3 psi
	d) Bottom to sidewall	Vacuum box plus MT or PT
	e) Nozzle to tank side	MT or PT
	f) Nozzle to roof	VT
	g) Joints in nozzles	RT
	h) Others	Similar welds in vessels
Storage Tanks (0-15 psi)	a) Sidewall	RT
	b) Roof	RT
	c) Roof-to-sidewall	RT, if not possible, MT or PT
	d) Bottom & bottom-to-side	Vacuum box method plus MT or PT
	e) Nozzle tank	MT or PT
	f) Joints to nozzles	RT
	f) Others	Same as similar vessel joints

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS (CONTINUED)

Component	CLASS 3 COMPONENTS (1) (2) (5) Weld Type	NDE Requirements
Vessels	Category A (Longitudinal)	
	1. a) Thickness exceeding the limits of Table ND.5211.2-1	RT
	b) Welds based on joint efficiency permitted by ND.3351.1	RT
	c) Butt welds in nozzles attached to vessels in a or b above	RT
	2. Welds not included in 1 above	Spot RT each 50 ft of weld. Additional RT to cover each welders work.
	3. Nonferrous vessels exceeding 3/8 inch	RT
Pump, Valve, Pipe	Pipes greater than 2 in. size Pumps & valves greater than 2 in.	RT, MT, or PT According to the product form
Vessel	Category B (Circumferential)	
	1. a) Thickness exceeds Table ND.5211.2 for ferrous metals	RT
	b) Thickness exceeds 3/8 in. for nonferrous metals	RT
	c) Joint efficiency according to ND.3352.1(a)	RT
	d) Attachments to vessels and exceeds nominal pipe size 10 in. or thickness 1 1/8 in.	RT
	2. Welds not involved in 1 above	RT 6 in. long sections plus the intersections of Category A welds
Pipe, Pump and Valve	Greater than 2 in. nominal pipe size	RT, PT, or MT
Vessel	Category C	
	1. a) Thickness exceeds Table ND-5211.2 or ND-5211.3	RT
	b) Attachments exceed 10 inch NPS or 1 1/8 in. wall thickness	RT
	2. Welds not involved in 1 or 2 above	Spot RT to cover each welders work
Pipe, Pump, Valves	Greater than 2 in. nominal pipe size	RT, PT, or MT

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS (CONTINUED)

CLASS 3 COMPONENTS (1) (2) (5) (Continued)

Component	Weld Type	NDE Requirements
Vessel	Category D	
	1. Full penetration butt welds designed for joint efficiency per ND.3352.1(a)	RT
	2. In nozzles or communicating chambers attached to vessels or heads requiring full RT	RT
	3. Welds not covered by 1 and 2 above	Spot RT to cover each welders work.
Pipe, Pump and Valve	Greater than 2 in. nominal pipe size	RT, PT, or MT
Special Welds	a) Weld metal cladding	PT
	b) Hard surfacing	PT
	(i) Hard surfacing for valves with inlet connection 4" nominal pipe size or less	None
	c) Tube-tube sheet welds	PT
	d) Brazed joints	VT
Storage Tanks (Atmospheric)	a) Sidewall joints	Same as Category A or B vessel joints
	b) Roof and roof-to-sidewall	VT
	c) Bottom joints	Vacuum box testing of at least 3 psi, or PT or MT plus VT during pressure test
	d) Bottom to sidewall	Same as bottom joints
	e) Nozzle to tank side	MT or PT
	f) Nozzle to roof	VT
	g) Joints in nozzles ex. roof nozzles	MT or PT
	h) Others	Similar welds in vessels
Storage Tanks (0-15 psi)	a) Sidewall	Same as Category A or B vessel joints
	b) Roof	Same as Category A vessel joints
	c) Roof-to-sidewall	Same as above, if possible, or MT or PT
	d) Bottom & bottom-to-side	Vacuum box testing at least 3 psi, or PT or MT plus VT during pressure test
	e) Nozzle to tank	MT or PT
	f) Joints in nozzles	MT or PT
	g) Others	Same as similar vessel joints

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS (CONTINUED)

	COMPONENTS SUPPORTS (1) (2) (7)	
Component	**Weld Type**	**NDE Requirements**
Class 1 Supports	Primary member, full penetration butt welds	RT
	All other welds	MT or PT
	Secondary member welds	VT
Class 2 and MC Supports	Primary member, full penetration butt welds	RT
	Partial penetration or fillet welds throat greater than 1 in.	MT or PT
	All other welds	VT
	Secondary member welds	VT
Class 3 Supports	Primary member, groove or throat greater than 1 in.	MT or PT
	All other welds	VT
	Secondary member welds	VT
Special Requirements, All Classes	Welds transmitting loads in the through thickness direction in members greater than 1 in.	UT base metal beneath the weld

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS (CONTINUED)

CORE SUPPORT STRUCTURES (1) (2) (8)

Component	Weld Type	NDE Requirements
Core Support Structures (Provide direct support or restraint of the fuel, etc. under normal operating conditions.)	Category A, longitudinal butt welds Category B, circumferential butt welds Category C, flange to shell welds Category D, nozzle to shell welds Category E, beam end connections to other structures	Examination may be by any technique or certain combinations of techniques, from simple VT to MT or PT plus RT or UT. Quality factor *n* and fatigue factor *f* are dependent on the technique(s) selected, in accordance with Table NG-3352-1.
	Repair welds under 3/8 in. or 10% deep	MT or PT
	Repair welds over 3/8 in. or 10% deep	MT or PT plus RT or UT
Internal Structures (Can be any other structure within the reactor vessel.) nonmandatory	Same as above	Same as above
Temporary Attachments (Removed before operation.)	All	MT or PT

NOTES:

(1) The required confirmation that facility welding activities are in compliance with the certified design commitments will include the following third-party verifications:

(a) Facility welding specifications and procedures meet the applicable ASME Code requirements;

(b) Facility welding activities are performed in accordance with the applicable ASME Code requirements;

(c) Welding activities related records are prepared, evaluated and maintained in accordance with the ASME Code requirements;

(d) Welding processes used to weld dissimilar base metal and welding filler metal combinations are compatible for the intended applications;

(e) The facility has established procedures for qualifications of welders and welding operators in accordance with the applicable ASME Code requirements;

(f) Approved procedures are available and used for preheating and post heating of welds, and those procedures meet the applicable requirements of the ASME Code;

(g) Completed welds are examined in accordance with the applicable examination method required by the ASME Code.

(2) Radiographic film will be reviewed and accepted by the licensee's nondestructive examination (NDE), Level III examiner prior to final acceptance.

Table 3.9-10

WELDING ACTIVITIES AND WELD EXAMINATION REQUIREMENTS FOR ASME CODE, SECTION III WELDS (CONTINUED)

Notes (continued):

(3) The NDE requirements for Class 1 components will be as stated in subarticle NB-5300 of Section III of the ASME Code.

(4) The NDE requirements for Class 2 components will be as stated in subarticle NC-5300 of Section III of the ASME Code.

(5) The NDE requirements for Class 3 components will be as stated in subarticle ND-5300 of Section III of the ASME Code.

(6) The NDE requirements for containment vessels will be as stated in subarticle NE-5300 of Section III of the ASME Code.

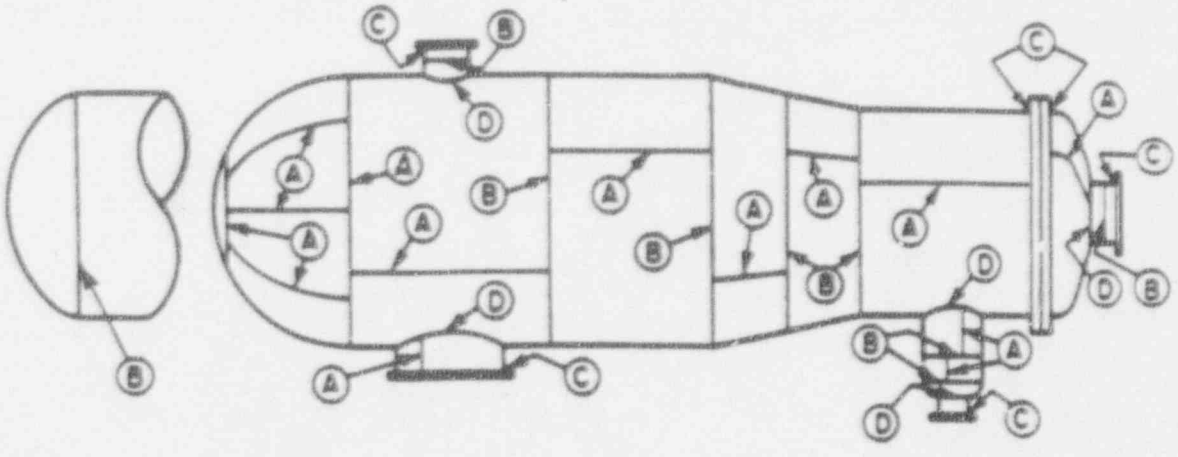
(7) The NDE requirements for component supports will be as stated in subarticle NF-5300 of Section III of the ASME Code.

(8) The NDE requirements for Core Support structures will be as stated in subarticle NG-5300 of Section III of the ASME Code.

(9) For corner joints UT may be used instead of RT. For Type 2 full penetration corner weld joints, if RT is used, the fusion zone, and parent metal beneath the attachment surface shall be UT examined after welding.

LEGEND:

RT - Radiographic Examination
UT - Ultrasonic Examination
MT - Magnetic Particle Examination
PT - Liquid Penetrant Examination
VT - Visual Examination
LEGEND (Continued):



Categories A, B, C, and D Welded Joint Typical Locations